Simulating urban densities in the face of local flood risks

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The presentation fully complies with the aim of the conference session, i.e. “Informing land and soil policies with science based tools”. It will make clear how science can inform soil policy impact assessment with regards to the linkage of soil policies/land management with water, food and energy security. We aim to give an overview of the current scientific knowledge on indicators, data and methods/tools for the assessment of the impact of land management on soil threats and related soil functions in view of the water, food and energy nexus, according to a common framework. This will include an overview of (i) land management measures affecting different threats, (ii) relevant soil threat indicators in view of the related soil functions, (iii) data and methods to calculate and spatially visualize the relevant indicators, (iv) tools to quantify the linkage of land management options to soil threats and soil functions and (v) examples of results of such quantifications.

0742	Modelling ecosystem service impacts from integrated land and water resource development in northern Australia	Neville Crossman	Australia

Robust quantification of changes to the supply of ecosystem services from land and water resource development and the documentation of subsequent trade-offs requires good modelled data. This is because water resource development for new irrigation will have significant impacts on ecosystem services. On the positive side, irrigation development supports agricultural intensification which increases food production and may allow land sparing for enhancing supply of ecosystem services. On the negative side, the changes in land use and the capture and extraction of water from relatively undeveloped ecosystems may have impacts on water quality, aquatic and terrestrial biodiversity, soil provision, and cultural, recreational and amenity services, among others. However, good data is not always available, especially in locations undergoing development.
The Australian and Queensland Governments have contracted CSIRO to investigate the potential trade-offs of water resource development in far north Australia, a geographic area that is relatively under-developed but which has substantial water resources. Both Governments have a strong interest in developing the water resources of remote northern Queensland Rivers for food production to supply growing demands from Asia. The problem we face is that modeled and mapped ecosystem service data is limited and the potential development of water resources is highly contested. We therefore propose a methodology that uses Bayesian Belief Networks (BBNs) to elicit stakeholder opinion about the important ecosystem services supplied (and demanded) in the region and the potential impacts to those services from water resource development. We then use the BBN to integrate this stakeholder information with quantitative modeled ecosystem service data where it is available, and identify the trade-offs in supply of ecosystem services following land and water development.

0746	Simulating urban densities in the face of local flood risks	Dani Broitman, Bart Rijken, Eric Koomen	The Netherlands

The Netherlands is situated in a delta region, with about one third of its land area below sea level. At the same time, it has a very high population density, especially in the low-lying Randstad area. So both the chances of flooding and the resulting potential damage have been an issue of great concern in past centuries and continue to be so because of the expected sea level rise and urban development in low-lying areas. Strategies aimed at reducing flood risk have hitherto focused on reducing the chances of flooding, e.g., by building extensive flood defense systems (levies etc.). These systems, however, are never completely flood-proof. Further increasing their defense capacities is getting increasingly difficult and costly. At the same time, the economic value and population concentrated behind these barriers is growing, thus further increasing potential flood damage. Indeed, especially if the indirect effects (i.e., beyond the value of individual lives and buildings) are taken into account, this damage could be

devastating. Depending on the (political) question of what chances and damage would be 'acceptable', this may well justify a shift of focus from (regional) chances to (local) effects.
Local adaptation measures aimed at minimizing damage and casualties at the parcel or neighborhood level may thus be needed. In combination with urban renewal plans that strive to upgrade the quality of life in older neighborhoods such adaptation measures may help to also achieve other public (or private) objectives. The (cost) effectiveness of such measures strongly depends on the resulting local land-use patterns in relation to potential flooding. These dynamics can be explored using the Land Use Scanner model and potential flood water depth maps from a hydrological model. At present, Land Use Scanner only simulates the dominant local land use (residential, agricultural etc.). In order to properly assess these measures, we need to go beyond this and simulate the characteristics of the actual structures (building types, density, value etc.) occupying the land. This paper presents a conceptual model of the main drivers of local residential density change, describes their initial implementation in a land-use change model and discusses the first results in the context of flood risk assessment. It aims to shed light on the cost effectiveness of local climate adaptation measures, preparing the ground for future modeling efforts based on more formalized, validated version of the model.

0748	Using results of an integrated land use model to assess the biodiversity impacts of REDD+ policies	Rebecca Mant, Valerie Kapos	UK

Policies for achieving REDD+ goals will have major impacts on land use and resulting land cover. Land-use and land cover in turn affect biodiversity, and the potential for achieving the goals of the Convention on Biological Diversity (CBD). Thus, understanding how different policies could influence land use and biodiversity is essential to support informed decision-making and identify REDD+ policies that can safeguard biodiversity and help meet the goals of the CBD. The REDD-PAC project uses a global economic and land use model (GLOBIOM; described in detail elsewhere in this session), to project future land use and changes in land cover. We then use the model results to assess the biodiversity impact of the predicted land cover change, focusing on Brazil and the Congo Basin.
The impact on biodiversity is investigated using two broad approaches. Firstly, potential land cover change is assessed within in areas identified through national and regional processes as priorities for biodiversity conservation. Land use change and its biodiversity impacts within these areas are assessed spatially, both in terms of total conversion from natural land cover through productive use (agriculture, grazing or forestry) and in relation to particular types of conversion (for example deforestation). Secondly, impacts on biodiversity of potential future land cover change are assessed in terms of habitat changes within current species ranges. Assessing such changes across species provides a combined assessment of the amount of range species may lose under different future policy scenarios. For example, assessing the impact across threatened species allows an assessment of the possibility for achieving the global CBD Aichi target 12 on reducing extinction of threatened species.

0749	Making use of the ecosystem services concept in regional planning - trade-offs from reducing water erosion	Susanne Frank, Christine Fürst, Anke Witt, Lars Koschke, Franz Makeschin	Germany

In this presentation, we demonstrate how to integrate the ecosystem services concept into regional planning using the example of a case study region, Upper Elbe Valley/Eastern Ore Mountains, in Saxony, Germany. We analysed how the reduction of water erosion as a regulating service impacts seven other ecosystem services. Ecological integrity, provisioning services (provision of food and fibre, provision of biomass), regulating services (soil erosion protection, drought risk regulation, flood regulation), and the cultural service landscape aesthetics are taken into account. With the help of the